Volume 146, 1994

JOURNAL OF CATALYSIS

EDITORS

W. Nicholas Delgass, *Purdue University* Frank S. Stone, *University of Bath*

ASSOCIATE EDITOR

M. Albert Vannice, *Pennsylvania State University*

EDITORIAL BOARD

A. T. Bell
University of California Berkeley
D. G. Blackmond
Merck & Co., Inc.
J. S. Bradley
Exxon Res. & Eng. Comp.
R. L. Burwell, Jr.
Northwestern University
C. T. Campbell
University of Washington
M. Che
Université Pierre et Marie Curie
M. E. Davis
California Institute of Technology
P. Gallezot
IRC, Villeurbanne
W. O. Haag
Mobil Res. & Dev. Corp.
W. K. Hall
University of Pittsburgh
G. L. Haller
Yale University
Y. Iwasawa
University of Tokyo
V. B. Kazansky
Zelinsky Inst. of Organic Chem.
H. Knözinger
University of Munich
J. H. Lunsford
Texas A&M University
J. E. Lyons
Sun Company
G. B. McVicker
Exxon Res. & Eng. Comp.
M. Misono
University of Tokyo
F. Solymosi
Attila József University
K. C. Taylor
General Motors Res. Labs.
Henrik Topsøe
Haldor Topsøe A/S
R. A. van Santen
Eindhoven University of Technology
R. S. Weber
Yale University
P. B. Wells
University of Hull

Founding Editors: J. H. de Boer and P. W. Selwood

ACADEMIC PRESS, INC.
Harcourt Brace & Company
San Diego New York Boston London Sydney Tokyo Toronto

Copyright © 1994 by Academic Press, Inc.
All Rights Reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owner.

The appearance of the code at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use, or for the personal or internal use of specific clients. This consent is given on the condition, however, that the copier pay the stated, per copy fee through the Copyright Clearance Center, Inc. (222 Rosewood Drive, Danvers, Massachusetts 01923), for copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. Copy fees for pre-1994 articles are as shown on the article title pages; if no fee code appears on the title page, the copy fee is the same as for current articles.

0021-9517/94 $6.00

MADE IN THE UNITED STATES OF AMERICA

This journal is printed on acid-free paper.

CONTENTS OF VOLUME 146

Number 1, March 1994

Comparison of Monolith-Supported Metals for the Direct Oxidation of Methane to Syngas	P. M. Torniainen, X. Chu, and L. D. Schmidt	**1**
Synthesis Gas Formation by Catalytic Oxidation of Methane in Fluidized Bed Reactors	S. S. Bharadwaj and L. D. Schmidt	**11**
FTIR Study of the Interaction of Methanol with Clean and Potassium-Doped Pd/SiO_2 Catalysts	J. Raskó, J. Bontovics, and F. Solymosi	**22**
Free Surface Determination of Used Ni/SiO_2 Hydrogenation Catalysts by CO Adsorption and H_2/D_2 Reaction	Åsa Wrammerfors and Bengt Andersson	**34**
Isobutane Dehydrogenation over Sulfided Nickel Catalysts	Daniel E. Resasco, Bonnie K. Marcus, Chen S. Huang, and Vincent A. Durante	**40**
The Production of Nitrogen Oxides on Platinum and Nickel from Atomic Nitrogen and Molecular Oxygen	M. E. Ryskin and S. V. Syromiatnikov	**56**
Structural Stability and Surface, Acidic, and Catalytic Properties of Magnesium Aluminophosphate of Type 36: Influence of Mg/P Ratios and of Thermal and Hydrothermal Treatments	Deepak Bansilal Akolekar	**62**
Deactivation Model with Residual Activity to Study Thioresistance and Thiotolerance of Naphtha Reforming Catalysts	A. Borgna, T. F. Garetto, A. Monzón, and C. R. Apesteguía	**69**
A Time-of-Flight SIMS Study of the Chemical Nature of Highly Dispersed Pt on Alumina	Y. Zhou, M. C. Wood, and N. Winograd	**82**
A Kinetic Model for the Hexane Cracking Reaction over H-ZSM-5	D. B. Lukyanov, V. I. Shtral, and S. N. Khadzhiev	**87**
Glucose Hydrogenation on Promoted Raney-Nickel Catalysts	P. Gallezot, P. J. Cerino, B. Blanc, G. Flèche, and P. Fuertes	**93**
Dispersion Measurement by the Single Introduction Method Coupled with the Back-Sorption Procedure: A Chemisorption and TPD Study of the Different Chemisorbed Hydrogen Species. I. Pt, Ru, and Rh on Alumina	Roberto Giannantonio, Vittorio Ragaini, and Paolo Magni	**103**
Dispersion Measurement by the Single Introduction Method Coupled with the Back-Sorption Procedure: A Chemisorption and TPD Study of the Different Chemisorbed Hydrogen Species. II. Pd on Alumina	Vittorio Ragaini, Roberto Giannantonio, Paolo Magni, Luca Lucarelli, and Giuseppe Leofanti	**116**
Structural, Surface, and Catalytic Properties of Bismuth Molybdovanadates Containing Foreign Atoms. V. Oxidative Dehydrogenation of 1-Butene on Iron-Containing Bismuth Molybdovanadate Catalysts	S. De Rossi, M. Lo Jacono, M. Gardini, and P. Porta	**126**
NO Reduction by CO over Rh/Al_2O_3. Effects of Rhodium Dispersion on the Catalytic Properties	J. Kašpar, C. de Leitenburg, P. Fornasiero, A. Trovarelli, and M. Graziani	**136**
Effect of the K–Mo Interaction in K–MoO_3/γ-Al_2O_3 Catalysts on the Properties for Alcohol Synthesis from Syngas	Ming Jiang, Guo-Zhu Bian, and Yi-Lu Fu	**144**
Characterization of the Acidic and Basic Properties of $\alpha LiAlO_2$, $\gamma LiAlO_2$, and Calcined "$HAlO_2$" Using Isopropyl Alcohol	D. C. Tomczak, J. L. Allen, and K. R. Poeppelmeier	**155**

5 731HI XL 9/94 31249-223 1385

Dehydroxylation of the Surface Magnesium Oxide by Temperature Programmed Desorption	Henryk Duński, Wojciech K. Jóźwiak, and Henryk Sugier	**166**
FTIR Spectroscopic Study of the Interaction of CO_2 and $CO_2 + H_2$ over Partially Oxidized Ru/TiO_2 Catalyst	N. M. Gupta, V. S. Kamble, V. B. Kartha, R. M. Iyer, K. Ravindranathan Thampi, and M. Gratzel	**173**
Isobutane/2-Butene Alkylation on Ultrastable Y Zeolites: Influence of Zeolite Unit Cell Size	A. Corma, A. Martínez, and C. Martínez	**185**
The Structure and Function of Supported Molybdenum Nitride Hydrodenitrogenation Catalysts	Craig W. Colling and Levi T. Thompson	**193**
Effect of Alkali Metal Cations on the Structure of $Mo(VI)/SiO_2$ Catalysts and Its Relevance to the Selective Oxidation of Methane and Methanol	Miguel A. Bañares, Nicholas D. Spencer, Michael D. Jones, and Israel E. Wachs	**204**
The Peculiarities of the Ethylation of Toluene and Benzene on Modified Beta Zeolites	V. N. Romannikov and K. G. Ione	**211**
Molybdenum Nitride Catalysts. I. Influence of the Synthesis Factors on Structural Properties	Jeong-Gil Choi, Rane L. Curl, and Levi T. Thompson	**218**
Thermal Analysis of Adsorbed Propanamines for the Characterization of Ga–MFI Zeolites	Vladislav Kanazirev, Kerry M. Dooley, and Geoffrey L. Price	**228**
Estimates of Rate Coefficients for Elementary Processes Occurring during Fischer–Tropsch Synthesis over Ru/TiO_2	Takashi Komaya and Alexis T. Bell	**237**
Amination of 2-Methylpropene over Proton-Exchanged ZSM-5 Zeolite Catalysts	Noritaka Mizuno, Masahiro Tabata, Takeshi Uematsu, and Masakazu Iwamoto	**249**
Methylamine Synthesis over Solid Acid Catalysts: Microcalorimetric and Infrared Spectroscopic Studies of Adsorbed Species	D. T. Chen, L. Zhang, Chen Yi, and J. A. Dumesic	**257**
Influence of the *A*-Site Cation in $ACoO_3$ (A = La, Pr, Nd, and Gd) Perovskite-Type Oxides on Catalytic Activity for Methane Combustion	A. Baiker, P. E. Marti, P. Keusch, E. Fritsch, and A. Reller	**268**
Selective Oxidation of Carbon Monoxide in the Presence of Butane and Maleic Anhydride	David R. Corbin and Cristobal Bonifaz	**277**
Influence of Water in the Deactivation of a Sulfided $NiMo/\gamma\text{-}Al_2O_3$ Catalyst during Hydrodeoxygenation	Etienne Laurent and Bernard Delmon	**281**
***In Situ* Controlled Promotion of Catalyst Surfaces via NEMCA: The Effect of Na on the Pt-Catalyzed CO Oxidation**	I. V. Yentekakis, G. Moggridge, C. G. Vayenas, and R. M. Lambert	**292**
Notes		
Spectroscopic Determination of Oxidation and Coordination States of Mo Cations in the Reduced Mo/Al_2O_3 Catalyst	Xingtao Gao and Qin Xin	**306**
An Explanation of the Compensation Effect in Catalysis	William R. Patterson and John J. Rooney	**310**
Hydrodehydroxylation and Hydrodehalogenation of Substituted Polycyclic Aromatics Using Carbon Catalysts	Malvina Farcasiu, Steven C. Petrosius, and Edward P. Ladner	**313**
Characterization of the Acidic Properties of Niobia-Containing Aerogels with [^{18}O]Ethanol Dehydration	E. C. DeCanio, V. P. Nero, and E. I. Ko	**317**

Book Reviews

Fluid Catalytic Cracking: Science and Technology. **Edited by J. S. Magee and M. M. Mitchell, Jr.** — P. B. Venuto — **320**

Spectroscopy in Catalysis. **By J. W. Niemantsverdriet.** — Daniel E. Resasco — **321**

Number 2, April 1994

Reactivity of Supported Vanadium Oxide Catalysts: The Partial Oxidation of Methanol — Goutam Deo and Israel E. Wachs — **323**

Effect of Additives on the Structure and Reactivity of the Surface Vanadium Oxide Phase in V_2O_5/TiO_2 Catalysts — Goutam Deo and Israel E. Wachs — **335**

Transient Studies on Reaction Steps in the Oxidative Coupling of Methane over Catalytic Surfaces of MgO and Sm_2O_3 — O. V. Buyevskaya, M. Rothaemel, H. W. Zanthoff, and M. Baerns — **346**

Degenerate Non-primary Products in Catalytic Cracking of Isoalkanes — Y. V. Kissin — **358**

Catalytic Oxidation of Dimethyl Methylphosphonate — T. Z. Tzou and S. W. Weller — **370**

On the Structural Differences between Alumina-Supported CoMoS Type I and Alumina-, Silica-, and Carbon-Supported CoMoS Type II Phases Studied by XAFS, MES, and XPS — S. M. A. M. Bouwens, F. B. M. van Zon, M. P. van Dijk, A. M. van der Kraan, V. H. J. de Beer, J. A. R. van Veen, and D. C. Koningsberger — **375**

NO–CO Activity and Selectivity over a $Pt_{10}Rh_{90}(111)$ Alloy Catalyst in the 10-Torr Pressure Range — K. Y. Simon Ng, David N. Belton, Steven J. Schmieg, and Galen B. Fisher — **394**

An Infrared Study of the Dehydrogenation of Ethylbenzene to Styrene over Iron-Based Catalysts — William P. Addiego, Cesar A. Estrada, D. Wayne Goodman, Michael P. Rosynek, and Rebecca G. Windham — **407**

FT-IR Assessment through Pyridine Adsorption of the Surface Acidity of Alkali-Doped MoO_3/TiO_2 — C. Martín, I. Martín, C. del Moral, and V. Rives — **415**

Elementary Steps in CO Hydrogenation on Rh Catalysts Supported on ZrO_2 and Mo/ZrO_2 — E. Guglielminotti, E. Giamello, F. Pinna, G. Strukul, S. Martinengo, and L. Zanderighi — **422**

Temperature-Programmed Reduction of Oxidic and Sulfidic Alumina-Supported NiO, WO_3, and $NiO–WO_3$ Catalysts — P. J. Mangnus, A. Bos, and J. A. Moulijn — **437**

Nitric Oxide Reduction by CO on Cu/TiO_2 Catalysts — F. Boccuzzi, E. Guglielminotti, G. Martra, and G. Cerrato — **449**

Formation of Conjugated Iminium Ions from Pyridine on Dealuminated Mazzite — Bich Huong Chiche, François Fajula, and Edoardo Garrone — **460**

Catalytic Properties of Framework Fe^{3+} in MFI-Type Ferrisilicate: Reaction Mechanism Studies of CO Oxidation Using an Isotopic Tracer Technique — Md. Azhar Uddin, Takayuki Komatsu, and Tatsuaki Yashima — **468**

Oxidation of Alcohols with H_2O_2 Catalyzed by Titanium Silicalite-1 — Federico Maspero and Ugo Romano — **476**

Luminescence and IR Characterization of Acid Sites on Alumina — Yan-Fei Shen, Steven L. Suib, Michel Deeba, and Gerald S. Koermer — **483**

Mechanism of Thermal Decomposition of Potassium/Ammonium Salts of the 12-Molybdophosphoric Acid and Effect on the Catalytic Performance in the Isobutyric Acid Oxidehydrogenation	S. Albonetti, F. Cavani, F. Trifirò, M. Gazzano, M. Koutyrev, F. C. Aissi, A. Aboukais, and M. Guelton	**491**
Reactivity of 3-Methyl-Crotonaldehyde on Pt(111)	T. Birchem, C. M. Pradier, Y. Berthier, and G. Cordier	**503**
N_2O Reduction by CO over an Alumina-Supported Pt Catalyst: Steady-State Multiplicity	Ramakant R. Sadhankar, Jing Ye, and David T. Lynch	**511**
Mechanism of *n*-Propyltoluene Formation in C_3 Alkylation of Toluene: The Effect of Zeolite Structural Type	Blanka Wichterlová and Jiří Čejka	**523**
Hydrogen Chemisorption on Potassium Promoted Supported Ruthenium Catalysts	Deniz O. Uner, Marek Pruski, Bernard C. Gerstein, and Terry S. King	**530**
Kinetics of the Complete Oxidation of Methane over Supported Palladium Catalysts	F. H. Ribeiro, M. Chow, and R. A. Dalla Betta	**537**
Chromia on Titania. IV. Nature of Active Sites for Selective Catalytic Reduction of NO by NH_3	H. Schneider, U. Scharf, A. Wokaun, and A. Baiker	**545**
Switchover of Reaction Paths in the Catalytic Decomposition of Formic Acid on TiO_2(110) Surface	H. Onishi, T. Aruga, and Y. Iwasawa	**557**
Catalytic Reduction of NO by CH_4 over Li-Promoted MgO	Xiankuan Zhang, Arden B. Walters, and M. Albert Vannice	**568**
Notes		
Aromatisation of *n*-Octane over Pt-Based Catalysts: Influence of the Support on the Product Distribution among C_8 Aromatics	P. Mériaudeau, A. Thangaraj, C. Naccache, and S. Narayanan	**579**
Catalytic Hydrogenation of Propylene over Perovskite-Type Oxides $La_{0.8}Sr_{0.2}MO_{3-\delta}$ (M = Cr, Mn, Fe, Co, or Y)	N. Gunasekaran, J. J. Carberry, R. Doshi, and C. B. Alcock	**583**
Kinetic Oscillations during Acetylene Hydrogenation over Pt/Al_2O_3 and Pd/Al_2O_3 in the Presence of CO	Ulf Schröder	**586**
Evidence for Site Isolation in Rh–Mo Bimetallic Catalysts Derived from $CpRhMo(CO)_3(PPh_3)_2$	Mure Te, Eric E. Lowenthal, and Henry C. Foley	**591**
Comparison of the Kinetics and Mechanism of 3-Methylpentane and 2-Methylpentane Cracking on USHY	Yingxian Zhao, G. R. Bamwenda, and B. W. Wojciechowski	**594**
Large Pore Alumina	Marten Ternan	**598**
On the Microstructure of the Coprecipitated Ni–Al_2O_3 Catalysts	Ryszard Lamber and Günter Schulz-Ekloff	**601**
Novel Multimetallic Hydroisomerization Catalysts	Wan Cheng Lu, Hsuan Chang, and Jonathan Phillips	**608**
Site Differentiation in Homolytic vs. Heterolytic Activation of Methane over Ba/MgO Catalysts	Dhammike Dissanayake, Jack H. Lunsford, and Michael P. Rosynek	**613**
Book Reviews		
Heterogeneous Catalysis and Fine Chemicals III. Edited by M. Guisnet, J. Barbier, J. Barrault, C. Bouchoule, D. Duprez, G. Perot, and C. Montassier	Robert L. Augustine	**616**

Catalysis: An Integrated Approach to Homogeneous, Heterogenous and Industrial Catalysis. Edited by J. A. Moulijn, P. W. N. M. van Leeuwen, and R. A. van Santen B. C. Gates **616**

Author Index for Volume 146 **618**

NOTICE

The Subject Index for Volume 146 will appear in the December 1994 issue as part of a cumulative index for the year 1994.

Digitized by the Internet Archive
in 2023 with funding from
Kahle/Austin Foundation

https://archive.org/details/journal-of-catalysis_1994_146_contents

JOURNAL OF CATALYSIS

INFORMATION FOR AUTHORS

The ***Journal of Catalysis*** publishes articles dealing with original studies in heterogeneous and homogeneous catalysis as well as studies relating catalytic properties with chemical processes at surfaces, studies of chemistry of surfaces, and engineering studies related to catalysis. All articles will be published in English.

Submission of Manuscripts. Manuscripts should be sent by registered mail to either of the Editors:

Professor W. Nicholas Delgass
c/o ***Journal of Catalysis***
Editorial Office
Suite 1900
525 B Street
San Diego, California 92101-4495
Telephone: (619) 699-6469
Fax: (619) 699-6859

or

Professor Frank S. Stone
School of Chemistry
University of Bath
Bath BA2 7AY, England

Original papers only will be considered. Manuscripts are accepted for review with the understanding that the same work has not been published, that it is not under consideration for publication elsewhere, and that its submission for publication has been approved by all of the authors and by the institution where the work was carried out; further, that any person cited as a source of personal communications has approved such citation. Written authorization may be required at the Editor's discretion. Articles and any other material published in the ***Journal of Catalysis*** represent the opinions of the author(s) and should not be construed to reflect the opinions of the Editor(s) and the Publisher.

Authors submitting a manuscript do so on the understanding that if it is accepted for publication, copyright in the article, including the right to reproduce the article in all forms and media, shall be assigned exclusively to the Publisher. The Publisher will not refuse any reasonable request by the author for permission to reproduce any of his or her contributions to the journal.

Form of Manuscript. Manuscripts should be concise and consistent in style, spelling, and use of abbreviations. Submit manuscript (in English) in quadruplicate, including the original typewritten copy, with copies of all figures and tables. Originals of micrographs should also be submitted in quadruplicate for purposes of manuscript reviewing. All material (including tables, reference lists, etc.) should be typed double-spaced on one side of 8.5 × 11-in. white bond paper (with 1-in. margins on all sides). Each page of the manuscript should be numbered. *Page 1* should contain the article title, authors' names (without degrees), affiliations, a running title (abbreviated form of title) not exceeding 55 letters and spaces, and the name and complete mailing address (also telephone and fax numbers and e-mail address, if possible) of the person to whom proof should be mailed. *Page 2* should contain a short abstract.

Authors should use descriptive headings in this order: Abstract, Introduction, Methods, Results, Discussion, Acknowledgments, and References.

In the Methods section, authors should draw attention to any particular chemical or biological hazards that may be involved in carrying out the experiments described. Any relevant safety precautions should be described; if an accepted code of practice has been followed, a reference to the relevant standards should be given.

If the manuscript refers to recently submitted manuscripts or papers in press (with the ***Journal of Catalysis*** or other journals) then please supply three copies of them so that the reviewers can judge the new manuscript in its proper context.

Revised manuscripts should be returned with one copy marked to show where changes have been made.

Notes and **Letters to the Editor** may not exceed 8 double-spaced typewritten manuscript pages (including tables and figures). Accepted Notes will not receive publication priority over articles.

Letters to the Editor will be considered for priority publication under the following conditions: (a) Letters must be related to some statement made in a recently published article in this Journal; (b) in cases of conflicting views on any topic, no more than one Letter from each author will be accepted.

Units of weights, measures, etc., when used in conjunction with numerals should be abbreviated and unpunctuated (e.g., 10%, 50 ml, 3 g, 8 cm).

The SI (Systeme International) system of units will be accepted without editorial change. Authors using other units are encouraged to define them in terms of SI units once in each publication, e.g., in an article where pressures are quoted in Torr to write "1 Torr = 133.3 N m^{-2}." For information concerning SI units, see *Quantities, Units and Symbols for Physical Chemistry,* 4th ed., prepared by I. Mills and published by Blackwell Scientific, Oxford, 1988.

Footnotes should be avoided if possible; but if essential, they should be designated by superscript Arabic numerals (starting with title) in the text.

Tables should be numbered with Arabic numerals in order of mention in the text. They should be typed double-spaced on separate pages. Each table should have a short descriptive caption typed (double-spaced) above the table. Table footnotes (indicated by superscript, lowercase, italic letters) should be typed at the end of the table.

Figures should be numbered with Arabic numerals in order of mention in the text; each figure should have a descriptive legend. Legends should be typed double-spaced together on a separate page. All illustrations should be in finished form suitable for reproduction. They should be planned to fit the proportion of the printed page ($7\frac{1}{8}$ × 9 in.; column width, 3.5 in.). No figures should exceed 8.5 × 11 in. (21 × 27.5 cm). Lettering on drawings should be of professional quality or generated by *high-resolution* computer graphics and should be large enough

(10–12 points) to take a reduction of 50–60%. Drawings should be made with black India ink on tracing linen, smooth-surface white paper, or Bristol board. Alternatively, *high-quality* computer graphics may be acceptable. Graph paper if used should be ruled in blue. Grid lines that are to show in the final reproduction should be inked in black.

Copies of drawings are not acceptable unless they are high contrast glossy prints. All but the very simplest structures and structural formulas must be designed for direct reproduction. Illustrations in color can be accepted only if the authors defray the cost.

Electron micrographs. Please supply four photographic copies of these so that the reviewers can inspect the fine details they contain.

References to the literature should be cited in the text by Arabic numerals in parentheses, set on the text line, and listed numerically at the end of the paper. Abbreviations of journal titles should follow the style used in the latest *Chemical Abstracts' Service Source Index*. Style and punctuation of references should be in accordance with the following examples:

1. Zhang, X., Jefferson, D. A., and Lambert, R. M., *J. Catal.* **141,** 583 (1993).
2. Louis, C., and Che, M., *in* "Reactivity of Solids" (P. Barret and L. C. Dufour, Eds.), Vol. B, p. 1057. Elsevier, Amsterdam, 1985.
3. Pines, H., "The Chemistry of Catalytic Hydrocarbon Conversions." Academic Press, New York, 1981.

Proofs. Proofs will be sent to the author, with a reprint order form. Authors will be charged for alterations in excess of 10% of the cost of composition.

Reprints. Fifty reprints without covers will be provided free of charge. Additional reprints may be purchased; an order form will be included with proofs.

Personal Computer Disks. Manuscripts may be submitted to the ***Journal of Catalysis*** on personal computer disks after the manuscript has been accepted and after all revisions have been incorporated onto the disk. Please supply the file as a straight ASCII file with generic codes specified by the publisher. Label the disk with the type of computer used, the type of software and the version number, and the disk format. All tabular and mathematical material will be typeset conventionally. Art must be prepared as camera-ready copy; see the section on Figures earlier in this Information for Authors.

A hard copy printout of the manuscript that exactly matches the disk file must be supplied. Academic Press will not accept disks without accompanying printouts of all files on the disk. File names must clearly indicate the content of each file. The manuscript will be edited according to the style of the journal, and the proofs must be read carefully by the author. Disks that are not translatable or economical to process will not be used. The publisher reserves the right not to use the disk.

For further information on preparing the disk for typesetting conversion and a list of generic codes, please contact the publisher (Editorial Supervisor, Journal Division, Academic Press, 525 B Street, Suite 1900, San Diego, California 92101-4495; telephone: (619) 699-6415; fax: (619) 699-6800).

Journal of Differential Equations

Editor-in-Chief
Jack K. Hale
Georgia Institute of Technology, Atlanta

The **Journal of Differential Equations** is concerned with the theory and the application of differential equations. The articles published are addressed not only to mathematicians, but also to those engineers, physicists, and other scientists for whom differential equations are valuable research tools.

Research Areas Include

- Mathematical control theory
- Ordinary differential equations
- Partial differential equations
- Related topics
- Stochastic differential equations
- Topological dynamics

Volumes 107–114 (1994), 16 issues
ISSN 0022-0396

In the U.S.A. and Canada: $1124.00
All other countries: $1308.00

Sample copies and privileged personal rates are available upon request.
For more information, please write or call:

ACADEMIC PRESS, INC.
Journal Promotion Department
525 B Street, Suite 1900, San Diego, CA 92101-4495
U.S.A. (800) 894-3434

All prices are in U.S. dollars and are subject to change without notice.
Canadian customers: Please add 7% Goods and Services Tax to your order.

S4069A

Devoted to the Application of Microtechniques in All Branches of Chemistry

Microchemical Journal

Published under the Auspices of the American Microchemical Society

Editor
Joseph Sneddon
University of Massachusetts, Lowell

Associate Editor
Donald R. Bobbitt
University of Arkansas, Fayetteville

At the Forefront of Modern Analytical Chemistry

Microchemical Journal focuses on microscale chemical analysis including clinically significant methods and procedures. Articles are at the forefront of modern analytical chemistry and cover innovations in techniques down to the finest possible limits. Special issues will contain state-of-the-art information by guest editors.

Research Areas Include

Both organic and inorganic work on

- All types of instrumentation, including clinical instrumentation
- Detection
- Determination
- Environmental analysis
- Forensic analysis
- Preparation
- Purification
- Separation
- Trace and subtrace analysis

Volumes 49–50 (1994), 6 issues ISSN 0026-265X In the U.S.A. and Canada: $306.00 All other countries: $384.00

For a free sample copy or for more information, please write or call:

ACADEMIC PRESS, INC., Journal Promotion Department
525 B Street, Suite 1900, San Diego, CA 92101-4495, U.S.A.
(800) 894-3434

All prices are in U.S. dollars and are subject to change without notice.
Canadian customers: Please add 7% Goods and Services Tax to your order.

S4098A